

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau



(43) International Publication Date
23 December 2004 (23.12.2004)

PCT

(10) International Publication Number
WO 2004/111598 A1

(51) International Patent Classification⁷: **G01M 3/20**

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(21) International Application Number:
PCT/US2004/018413

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(22) International Filing Date: 9 June 2004 (09.06.2004)

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MY, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
60/477,528 11 June 2003 (11.06.2003) US

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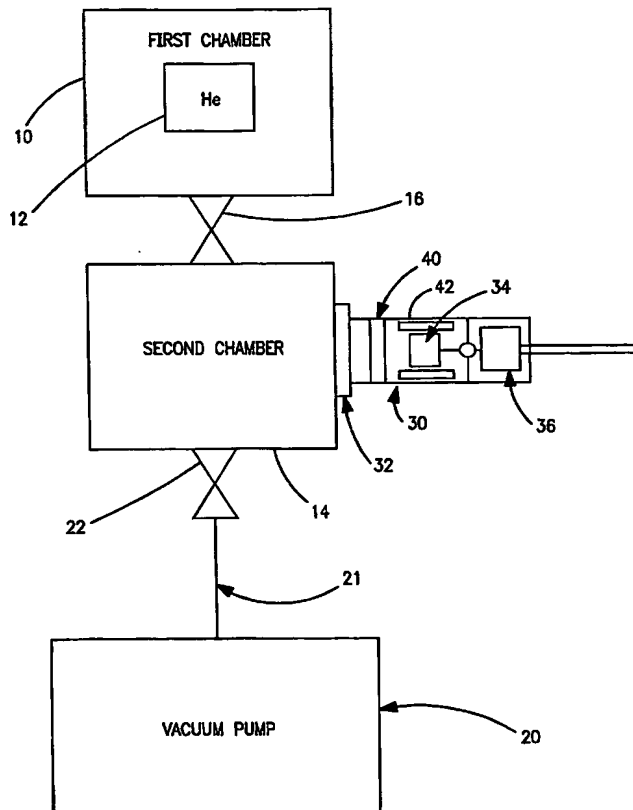
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(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI,

[Continued on next page]

(54) Title: METHODS AND APPARATUS FOR DETECTION OF LARGE LEAKS IN SEALED ARTICLES



(57) Abstract: Methods and apparatus are provided for detection of large leaks in sealed articles. Apparatus for leak detection includes a first sealable chamber configured to receive a test piece containing a trace gas, a second sealable chamber, a first valve coupled between the first and second chambers, a leak detector having a test port, a trace gas permeable member coupled between the second chamber and the test port of the leak detector, a vacuum pump having an inlet, and a second valve coupled between the second chamber and the inlet of the vacuum pump. The permeable member may be quartz, which is permeable to helium when heated. The leak detector may be an ion pump or a helium mass spectrometer leak detector.



FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI,
SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ,
GW, ML, MR, NE, SN, TD, TG).

— *before the expiration of the time limit for amending the
claims and to be republished in the event of receipt of
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Declaration under Rule 4.17:

— *of inventorship (Rule 4.17(iv)) for US only*

Published:

— *with international search report*

*For two-letter codes and other abbreviations, refer to the "Guid-
ance Notes on Codes and Abbreviations" appearing at the begin-
ning of each regular issue of the PCT Gazette.*

INTERNATIONAL SEARCH REPORT

International Application No

PCT/US2004/018413

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 G01M3/20

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 G01M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 014 892 A (BARET ET AL) 18 January 2000 (2000-01-18)	1,3,5,6, 9-11, 15-22
Y	abstract column 3 - column 4 figure 4	2,4,7,8, 12-14
Y	EP 0 352 371 A (VARIAN SPA) 31 January 1990 (1990-01-31) cited in the application	2,4,7,8, 12-14
A	abstract column 1, line 4 - line 14 column 2, line 41 - line 45 column 3, line 6 - line 12 column 3, line 52 - column 4, line 8 ----- -/--	19-22

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

27 October 2004

Date of mailing of the international search report

05/11/2004

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/US2004/018413

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>EP 0 632 258 A (VARIAN ASSOCIATES INC.) 4 January 1995 (1995-01-04) cited in the application abstract column 3, line 15 - column 4, line 47 column 5, line 19 - line 45 figures 1,2</p>	<p>1,5,6, 10,11, 17,18</p>
A	<p>US 5 661 229 A (BOHM ET AL) 26 August 1997 (1997-08-26)</p> <p>abstract column 1, line 10 - column 3, line 15 figures 1,2</p>	<p>2-4,7-9, 12-15, 19-22</p>

INTERNATIONAL SEARCH REPORT

International Application No
PCT/US2004/018413

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 6014892	A	18-01-2000	FR 2761776 A1	09-10-1998
			DE 69817650 D1	09-10-2003
			DE 69817650 T2	08-07-2004
			EP 0869344 A1	07-10-1998
			JP 10318877 A	04-12-1998
EP 0352371	A	31-01-1990	IT 1224604 B	04-10-1990
			DE 3872707 D1	13-08-1992
			DE 3872707 T2	29-08-1996
			EP 0352371 A2	31-01-1990
			HK 1000017 A1	03-10-1997
			JP 2054163 A	23-02-1990
			JP 2095652 C	02-10-1996
			JP 6001230 B	05-01-1994
EP 0632258	A	04-01-1995	US 5625141 A	29-04-1997
			DE 69420205 D1	30-09-1999
			DE 69420205 T2	23-03-2000
			EP 0632258 A2	04-01-1995
			JP 3390981 B2	31-03-2003
			JP 7146199 A	06-06-1995
US 5661229	A	26-08-1997	DE 4326265 A1	09-02-1995
			DE 59409544 D1	09-11-2000
			WO 9504921 A1	16-02-1995
			EP 0712488 A1	22-05-1996
			JP 9501237 T	04-02-1997